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SYNTHESIS

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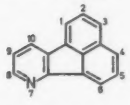
SYNTHESIS 1976

● Acenaphtho[1,2-*b*]pyridine



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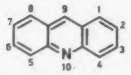

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- Reactions 385
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- α-Aminocarboxylic Acids and Derivatives
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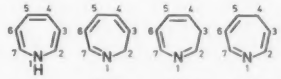
- 6-Azabicyclo[3.2.1]oct-3-enes
- Ring Synthesis 364

● 8-Azabicyclo[3.2.1]octane

- 8-Azabicyclo[3.2.1]oct-2-enes (Nortropidines)
- Anellation Reactions 105
- 8-Azabicyclo[3.2.1]oct-6-enes
- Ring Synthesis 586

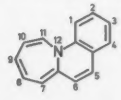
● Azepine



2*H*– 3*H*– 4*H*–

- 2,3,4,5-Tetrahydroazepines
- from Like Ring Skeletons 545
- Hexahydroazepines
- Anellation Reactions 201
- Ring Transformation 295

● Azepino[1,2-*a*]quinoline

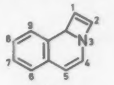


- 10,11-Dihydroazepino[1,2-*a*]quinolines
- Ring Synthesis 371

● Azete

- 1-Azetines
- Anellation Reactions and Ring Cleavage 369
- Azetidines
- Ring Synthesis 167, 357, 689
- Ring Transformation 294

● Azeto[2,1-*a*]isoquinoline



9b*H*–

- 1,2,4,5-Tetrahydro-9b*H*-azeto[2,1-*a*]isoquinolines
- Ring Synthesis 689

● Azido Compounds
- Azidoalkanes
- Synthesis 687, 823
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- General
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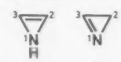
- Reactions without Cyclization 151
- Azines of Carboxylic Acid Derivatives
- Synthesis 259
- Ketazines
- Reactions without Cyclization 358

● Azirine



2*H*–

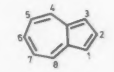
- Aziridines
- Ring Synthesis 30, 36, 62 (4642)
- Ring Cleavage 701 (4790)
- Ring Transformation 294, 298

● Azlactones
- Synthesis 560 (4764)

● Azo Compounds
see: Diazenes

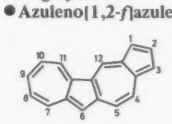
● Azomethine Imines
- Synthesis 357

● Azulene



- Azulenes
- Anellation Reactions 673
- 1,2,3,3a,4,8a-Hexahydroazulenes
- Ring Synthesis 583

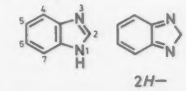
● Azuleno[1,2-*f*]azulene



- Ring Synthesis 673

● Benzenes
- Ring Synthesis 375, 583
- Ring Transformation 661

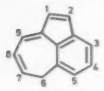
● Benzimidazole



2*H*–

- Ring Synthesis 146
- Anellation Reactions 189

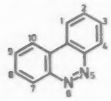
● **Benzo[*c,d*]azulene**



6*H*-

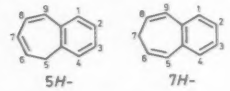
- 1,2,7,8-Tetrahydro-6*H*-benzo[*c,d*]azulenes
- Ring Syntheses 708

● **Benzo[*c*]cinnoline**



- Ring Synthesis 147

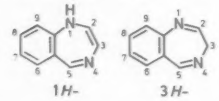
● **Benzocycloheptene**



5*H*- 7*H*-

- 5*H*-Benzocycloheptenes
- Ring Synthesis 370
- 3,4,4a,5,6,7,8,9-Octahydro-2*H*-benzocycloheptenes
- Ring Synthesis 778

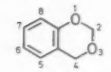
● **1,4-Benzodiazepine**



1*H*- 3*H*-

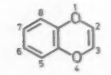
- 3*H*-1,4-Benzodiazepines
- from Like Ring Skeletons 136
- 2,3-Dihydro-1*H*-1,4-benzodiazepines
- Ring Transformation 136

● **1,3-Benzodioxin**



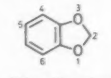
- Ring Synthesis 103

● **1,4-Benzodioxin**



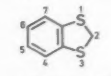
- 2,3-Dihydro-1,4-benzodioxins
- Ring Synthesis 658

● **1,3-Benzodioxole**



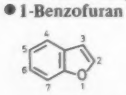
- Ring Synthesis 348 (4716)
- Reactions with Retention of the Ring Skeleton 123

● **1,3-Benzodithiole**



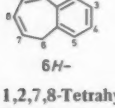
- 1,3-Benzodithioles
- Ring Synthesis 471, 759
- 1,3-Benzodithiolium Salts
- from Like Ring Skeletons 471, 759

● **1-Benzofuran**



- 2,3-Dihydro-1-benzofurans
- Ring Synthesis 624, 800
- 3a,7a-Dihydro-1-benzofurans
- Ring Synthesis 138
- 2,3,4,5,6,7-Hexahydro-1-benzofurans
- Ring Synthesis 98, 587
- 2,4,5,6,7,7a-Hexahydro-1-benzofurans
- Ring Synthesis 160

● **2-Benzofuran**



- Phthalans
- Ring Synthesis 116

● **Benzo[*f*]isoquinoline**

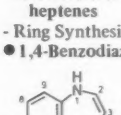
- 1,2-Dihydrobenzo[*f*]isoquinolines
- Ring Synthesis 252

● **2-Benzopyran**

1*H*- 3*H*-

- Isochromans
- Ring Cleavage 719

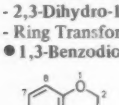
● **[1]Benzopyrano[3′,4′:5,6]pyrano[4,3-*b*]-pyridine**



5*H*,12*H*-

- 3,4-Dihydro-5*H*,12*H*-[1]benzopyrano-[3′,4′:5,6]pyrano[4,3-*b*]pyridines
- Ring Synthesis 312

● **[1]Benzopyrano[4,3-*d*]pyrimidine**



5*H*-

- Ring Synthesis 274

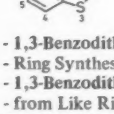
● **Benzo[*f*]quinoline**

- 1,2,3,4,5,6-Hexahydrobenzo[*f*]quinolines
- Ring Synthesis 362

● **Benzo[*h*]quinoline**

- 5,6-Dihydrobenzo[*h*]quinolines
- Ring Synthesis 18
- 1,2,3,4,5,6-Hexahydrobenzo[*h*]quinolines
- Ring Synthesis 362

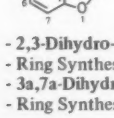
● **Benzo[*a*]quinolizine**



11b*H*-

- 6,7-Dihydro-11b*H*-benzo[*a*]quinolizines
- Ring Synthesis 367

● **Benzo[*c*]quinolizine**



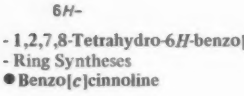
4a*H*-

- Ring Synthesis 371

● **1-Benzoselenophene**

- Ring Synthesis 447

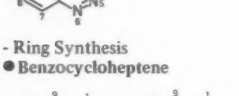
● **1-Benzothiapyran**



2*H*- 4*H*-

- 3,4-Dihydro-2*H*-1-benzothiapyrans
- Ring Synthesis 410

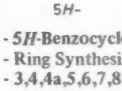
● **3,1-Benzothiazine**



2*H*- 4*H*-

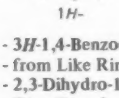
- 1,2-Dihydro-4*H*-3,1-benzothiazines
- Ring Synthesis 386

● **1,3-Benzothiazole**



- 1,3-Benzothiazoles
- Ring Synthesis 730
- Reactions with Retention of the Ring Skeleton 37
- 2,3-Dihydro-1,3-benzothiazoles
- from Like Ring Skeletons 200

● **1-Benzothiepin**



- 2,3,4,5-Tetrahydro-1-benzothiepins
- Anellation Reactions 708

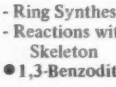
● **1-Benzothiophene**

- Ring Synthesis 451

● **1,2,3-Benzotriazine**

- 4*H*-1,2,3-Benzotriazines
- Ring Cleavage 717
- 5,6,7,8-Tetrahydro-4*H*-1,2,3-benzotriazines
- from Like Ring Skeletons 717

● **1,2,4-Benzotriazine**



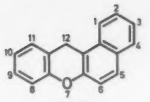
- 2,6-Dihydro-1,2,4-benzotriazines
- Ring Synthesis 459
- 2,3,4,6-Tetrahydro-1,2,4-benzotriazines
- from Like Ring Skeletons 460

● **Benzo[1,2-*c*:3,4-*c*′:5,6-*c*″]tripyrrole**

2*H*-

- Tetradecahydrobenzo-[1,2-*c*:3,4-*c*′:5,6-*c*″]tripyrroles
- Ring Synthesis 368

● **Benzo[*a*]xanthene**



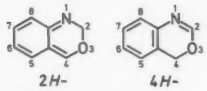
12*H*-

- 8,9,10,11-Tetrahydro-12*H*-benzo[*a*]xanthenes
- Ring Synthesis 111

● 1,3-Benzoxathiole

- 1,3-Benzoxathioles
- from Like Ring Skeletons 276 (4688)
- Ring Synthesis 757, 797
- Ring Cleavage 276 (4688)
- 1,3-Benzoxathiolium Salts
- Ring Synthesis 276 (4688), 757

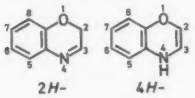
● 3,1-Benzoxazine



2*H*- 4*H*-

- Ring Synthesis 146
- Ring Transformation 806

● 1,4-Benzoxazine



2*H*- 4*H*-

- 3,4-Dihydro-2*H*-1,4-benzoxazines
- Ring Synthesis 658

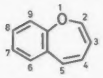
● 2,1-Benzoxazole

- Ring Transformation 373

● 1,3-Benzoxazole

- Ring Synthesis 146
- Reactions with Retention of the Ring Skeleton 37

● 1-Benzoxepin

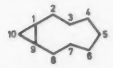


- 2,3,4,5-Tetrahydro-1-benzoxepins
- Anellation Reactions 709

● Bicyclo[4.3.1]decane

- Bicyclo[4.3.1]dec-3-enes
- Ring Synthesis 453

● Bicyclo[7.1.0]decane



- Ring Transformation 556 (4753)

● Bicyclo[3.1.1]heptane

- Bicyclo[3.1.1]heptenes
- Ring Cleavage 177

● Bicyclo[4.1.0]heptane

- Bicyclo[4.1.0]hept-3-enes
- Ring Synthesis 313

● Bicyclo[2.2.0]hexane

- Bicyclo[2.2.0]hexadienes (Dewar Benzenes)
- Ring Synthesis 378, 661

● Bicyclo[3.3.1]nonane

- Bicyclo[3.3.1]non-2-enes
- Ring Synthesis 788

● Bicyclo[4.2.1]nonane

- Bicyclo[4.2.1]non-3-enes
- Ring Synthesis 454

● Bicyclo[6.1.0]nonane

- Bicyclo[6.1.0]nonanes
- Ring Transformation 556 (4753)
- Bicyclo[6.1.0]non-4-enes
- Ring Transformation 461, 556 (4753)

● Bicyclo[2.2.2]octane

- Bicyclo[2.2.2]octenes
- Ring Synthesis 257

● Bicyclo[4.2.0]octane

- Ring Synthesis 63 (4647)
- Ring Cleavage 63 (4647)

● Bicyclo[5.1.0]octane

- Ring Transformation 556 (4753)

● Bicyclo[4.4.1]undecane

- Bicyclo[4.4.1]undec-3-enes
- Ring Synthesis 454

● Bicyclo[7.2.0]undecane

- Bicyclo[7.2.0]undec-4-enes
- Ring Synthesis 461

● Bile Pigments

- Synthesis 335

● Biphenylene

- Ring Synthesis 384

● Biphenyls

- Biphenyl Hydrocarbons
- Synthesis 205 (4671)
- Functionally Substituted Biphenyls
- Synthesis 40, 661, 666

● Bipyridines

- Synthesis 10

● Boranates (MBR_4)

- Synthesis 119, 488 (4745)
- Reactions 119, 488 (4745), 618, 649

● Boranes

- General
- Synthesis 634
- Reactions 637
- 1-Alkenylboranes
- Synthesis 118, 703 (4796)
- Dialkylboranes Type R_2BX
- Reactions 55 (4621), 629 (4774)
- Trialkylboranes
- Reactions 206 (4674), 488 (4745), 617, 618, 687, 703 (4796)

● *C*-Bromo Compounds

- General
- Reactions 60 (4635)
- *t*-Alkyl Bromides
- from Unlike Carbon Skeletons 251
- Bromoalkanes
- from Like Carbon Skeletons 485 (4735), 570, 839 (4821)
- Reactions 179
- Bromoalkenes Type C=C–Br
- from Like Carbon Skeletons 131 (4666), 385
- from Unlike Carbon Skeletons 196, 556 (4753)
- Reactions 131 (4665)
- Bromoarenes
- from Like Carbon Skeletons 622, 662
- α-Bromocarbonyl Compounds
- from Like Carbon Skeletons 194
- α-Bromocarboxylic Acid Derivatives
- from Like Carbon Skeletons 122, 331
- *gem*-Dibromoalkanes
- from Like Carbon Skeletons 699 (4785)
- from Unlike Carbon Skeletons 128 (4656)
- Reactions 461, 556 (4753), 772 (4806)
- *vic*-Dibromoalkanes
- from Like Carbon Skeletons 523
- Reactions 607
- 1,1-Dibromo-1-alkenes
- from Unlike Carbon Skeletons 198
- Heterocyclic *C*-Bromo Compounds
- Synthesis 288, 460, 691
- Reactions 412
- Miscellaneous Types
- Synthesis 198

● *N*-Bromo Compounds

- Synthesis 737

● Carbamic Acid Esters

- Alkyl Carbamates
- Synthesis 329
- Reactions 458
- Silyl Carbamates
- Synthesis and Reactions 704 (4799)
- *N*-Thioacylcarbamic Acid Esters
- Synthesis 704 (4798)
- Miscellaneous Types
- Synthesis 193

● Carbamimidic Halides

- Reactions 475

● Carbenes

- Alkoxycarbonylcarbenes
- Reactions 387
- Cyanocarbenes
- Reactions 387
- Dihalocarbenes
- Reactions 128 (4655)(4656), 196, 313, 485 (4737)
- Halocarbenes
- Reactions 181

● Carbimidodithioic Acid Esters

- Reactions 64 (4649)

● Carbodiimides

- Synthesis 208 (4682), 280 (4698)
● Carbonic Acid Esters
- Alkyl Aryl Carbonates
- Reactions 458
● Carboperoxoic Acids
- Synthesis 821
- Reactions 421 (4723)
● Carboximidic Acid Esters
- Synthesis 46
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- Reactions 536, 689
● Carboxonium Salts
- Synthesis 743
● Carboxylic Acid Amides, General
- General
- Synthesis 155, 702 (4795)
- Reactions 61 (4637), 700 (4788)
- *N*-(1-Alkenyl)-carboxamides
- Synthesis 208 (4681), 545
- *N*-Alkylcarboxamides
- Synthesis 272
- *N*-Arylcarboxamides
- Synthesis 255, 826
- *N,N*-Disubstituted Carboxamides
- Synthesis 61 (4638), 114
- Reactions 346 (4710), 545
- *N*-Monosubstituted Carboxamides
- Synthesis 32, 558 (4759),567
- Reactions 114, 242, 487 (4741)
● Carboxylic Acid Anhydrides
- Reactions 421 (4724)
● Carboxylic Acid Chlorides, General
- Reactions 329, 563, 767, 844 (4834)
● Carboxylic Acid Esters, General
- Synthesis 61 (4638), 702 (4794)
- Reactions without Cyclization 775 (4816)
- 1-Alkenyl Esters
- Synthesis 278 (4693)
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- Reactions without Cyclization 127 (4651), 526
- 2-Hydroxyalkyl Esters and *O*-Derivatives
- Cyclization Reactions 280 (4699)
● Carboxylic Acid Fluorides
- 2-Alkenoyl Fluorides
- Synthesis 761
- Aroyl Fluorides
- Synthesis 671
● Carboxylic Acid Hydrazides
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● Carboxylic Acid Imides
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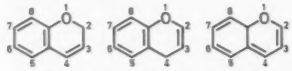
● Carboxylic Acids, General
- from Like Carbon Skeletons 61 (4637) (4638), 775 (4816), 808
● Catenanes
- Synthesis 588
● Cephams, Cephalosporins, and Relatives

Cepham

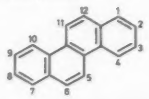
- Synthesis 689
● Charge-Transfer Complexes
- Synthesis 510
● *C*-Chloro Compounds
- *gem*-Arylchloroalkanes
- Reactions 608
- Chloroalkanes
- from Like Carbon Skeletons 398, 485 (4736), 839 (4821)
- from Unlike Carbon Skeletons 562
- Reactions 179
- Chloroalkenes Type C=C−Cl
- from Like Carbon Skeletons 34, 131 (4666), 555 (4748)
- from Unlike Carbon Skeletons 196
- Reactions 555 (4749)
- Chloroalkenes Type C=C−C−Cl
- Reactions 608
- Chloroarenes
- from Like Carbon Skeletons 622
- α-Chlorocarboxylic Acid Derivatives
- from Like Carbon Skeletons 122
- *gem*-Dichloroalkanes
- from Like Carbon Skeletons 62 (4642), 699 (4784)
- from Unlike Carbon Skeletons 128 (4655), 485 (4737)
- Reactions 60 (4635), 486 (4742), 608, 772 (4806)
- *vic*-Dichloroalkanes
- from Like Carbon Skeletons 34, 419 (4717)
- Reactions 607
- α,α′-Dichloroketones
- from Like Carbon Skeletons 34
- Heterocyclic *C*-Chloro Compounds
- Synthesis 29, 287, 412, 691
- Polychloro Compounds
- Reactions 47
- 1,1,1-Trichloro Compounds
- from Unlike Carbon Skeletons 570
● *N*-Chloro Compounds
- *N*-Chlorocarboxamides
- Reactions 46
- *N,N*-Dichlorosulfonamides
- Synthesis 732
● Cholic Acid and Relatives
- Synthesis and Reactions 125
● Chromene



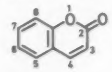
2*H*- 4*H*- 8a*H*-

- 2*H*-Chromenes
- from Like Ring Skeletons 753
- 4*H*-Chromenes
- Ring Synthesis and Cleavage 111
- Chromans
- from Like Ring Skeletons 267
- 5,6,7,8-Tetrahydro-8a*H*-1-benzopyrans
- Ring Synthesis 160
● Chromones

- Ring Synthesis 326
- Anellation Reactions 274
- Ring Cleavage 274
● Chrysene



- 1,2,3,4,4a,4b,5,6,12,12a-Decahydrochrysenes
- Ring Synthesis 778
● Coumarins



- Ring Synthesis 384, 716
- Anellation Reactions 680
● Crown Ethers
- Synthesis 168, 515, 516
- Toxicity 183
● Cyanamides
- Synthesis 591
- Reactions 269, 591
● Cyanogen Halides
- Reactions 448, 592
● Cycloalkanecarboxylic Acids
- General
- Reactions 251
- α-Haloacids
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- α-Hydroxyacids and *O*-Derivatives
- from Like Carbon Skeletons 825
● Cycloalkanes
- Alkylidenecycloalkanes
- Ring Synthesis 420 (4721)
- Cycloalkanediones
- Reactions with Retention of the Ring Skeleton 131 (4666)
- Cycloalkanones
- Anellation Reactions 112
- Functionally Substituted Cycloalkanes
- Ring Cleavage 93
● Cycloalkenes
- General
- Reactions with Retention of the Ring Skeleton 773 (4811)
- Cycloalkenones and Derivatives
- from Like Ring Skeletons 131 (4665) (4666), 555 (4748)
- Functionally Substituted Cycloalkenes
- Reactions with Retention of the Ring Skeleton 131 (4665)
- Miscellaneous Types
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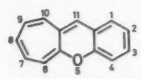
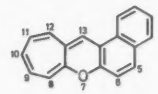
- from Like Ring Skeletons 338
● Cyclobutabenzene

- 1,2-Dihydrocyclobutabenzenes
- Ring Synthesis 151, 382, 584
● Cyclobutanes
- Alkylidenecyclobutanes
- Ring Synthesis 420 (4721)
- Cyclobutane Hydrocarbons
- Ring Synthesis 628 (4771)
- Functionally Substituted Cyclobutanes
- Ring Synthesis 177, 376, 581
● Cyclobutapyrimidine

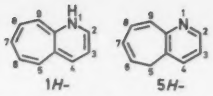
- 5,6-Dihydrocyclobutapyrimidines
- Ring Synthesis 379
● Cyclobutenes
- Cyclobutenediones and Derivatives
- from Like Ring Skeletons 445
● Cyclodecanes
- Ring Synthesis 74
● Cyclodecenes
- Ring Synthesis 556 (4753)
● Cyclohepta[*b*][1]benzopyran



- 6,7,8,9,10,11-Hexahydrocyclohepta[*b*][1]-benzopyrans
- Ring Synthesis 111
● Cyclohepta[*b*]naphtho[1,2-*e*]pyran



- 8,9,10,11,12,13-Hexahydrocyclohepta[*b*]-naphtho[1,2-*e*]pyrans
- Ring Synthesis 111
● Cycloheptanes
- Ring Synthesis 628 (4771)
● Cyclohepta[*b*]pyridine



- 1,2,3,4,6,7,8,9-Octahydro-5*H*-cyclohepta[*b*]pyridines
- Ring Synthesis 112
- **Cyclohepta[*b*]pyrrole**

- Ring Synthesis 20
- **Cycloheptenes**
- Cycloheptenones and Derivatives
- Ring Synthesis 196, 585
- **Cycloheptatrienes**
- Bi-cycloheptatrienyls
- from Like Ring Skeletons 798
- Cycloheptatrienones (Tropones)
- Ring Synthesis 585
- Anellation Reactions 20
- **Cyclohexadienes**
- 1,3-Cyclohexadienes
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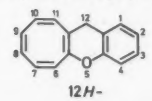
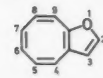
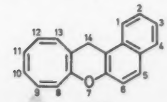
- Anellation Reactions 138
- 1,4-Cyclohexadienes
- from Like Ring Skeletons 136
- Ring Synthesis 584
- Cyclohexadienones
- from Like Ring Skeletons 101
- **Cyclohexanes**
- Alkylidenecyclohexanes
- Ring Synthesis 420 (4721)
- Cyclohexanedione and Derivatives
- from Like Ring Skeletons 542
- Ring Synthesis 361
- Anellation Reactions 587
- Reactions with Retention of the Ring Skeleton 555 (4748)
- Ring Transformation 110
- Cyclohexane Hydrocarbons
- Ring Synthesis 628 (4771)
- **Cyclohexenes**
- Cyclohexenediones and Derivatives
- from Like Ring Skeletons 604
- Cyclohexenones and Derivatives
- Ring Synthesis 584
- Ring Transformation 604
- Functionally Substituted Cyclohexenes
- Ring Synthesis 276 (4687)
- **Cyclononadienes**
- Ring Synthesis 461, 556 (4753)
- **Cyclononenes**
- Ring Transformation 556 (4753)
- **Cycloocta[*b*][1]benzopyran**



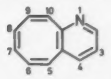
- 6,7,8,9,10,11-Hexahydrocycloocta[*b*][1]-benzopyrans
- Ring Synthesis 111
- **Cycloocta[*b*]furan**



- Decahydrocycloocta[*b*]furans
- Ring Synthesis 587
- **Cycloocta[*b*]naphtho[1,2-*e*]pyran**

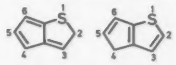


- 8,9,10,11,12,13-Hexahydro-14*H*-cycloocta[*b*]naphtho[1,2-*e*]pyrans
- Ring Synthesis 111
- **Cyclooct[*b*]pyridine**



- 1,2,3,4,5,6,7,8,9,10-Decahydrocycloocta[*b*]pyridines
- Ring Synthesis 112
- **Cyclooctenes**
- Ring Synthesis 556 (4753)
- **Cyclopentadienes**
- Cyclopentadienones
- Ring Transformation 338
- Functionally Substituted Cyclopentadienes
- Anellation Reactions 673
- Ring Transformation 231, 377
- **Cyclopentanes**
- Alkylidenecyclopentanes
- Ring Synthesis 420 (4721)
- Cyclopentanediones and Derivatives
- from Like Ring Skeletons 542
- Cyclopentane Hydrocarbons
- Ring Synthesis 582, 628 (4711)
- Functionally Substituted Cyclopentanes
- Ring Cleavage 93
- **Cyclopenta[*b*]pyrrole**

- 1,4,5,6-Tetrahydrocyclopenta[*b*]pyrroles
- Ring Synthesis 283, 303
- **Cyclopenta[*b*]thiophene**



- 4*H*-Cyclopenta[*b*]thiophenes
- Ring Synthesis 711
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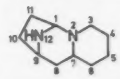

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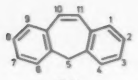
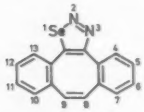


5*H*-

- from Like Ring Skeletons 798
● Dibenzo[3,4;7,8]cyclooocta[1,2-*d*]--1,2,3-selenadiazole



- 8,9-Dihydrodibenzo[3,4;7,8]cyclo-octa[1,2-*d*]-1,2,3-selenadiazoles
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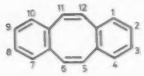

- 5,6-Didehydro-11,12-dihydrodibenzo[*a,e*]-cyclooctenes
- Ring Synthesis 338
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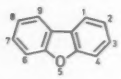
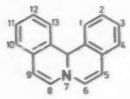


- Ring Synthesis 379
● Dibenzo[*a,h*]quinolizine



13b*H*-

- 5,6,8,9-Tetrahydro-13b*H*-dibenzo[*a,h*]-quinolizines
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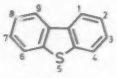

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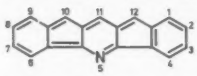

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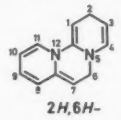

2*H*,6*H*-

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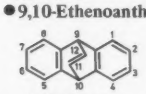

9,10-Dihydro-

-9,10-Dihydro-9,10-ethenoanthracenes
- Ring Synthesis 666
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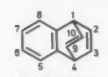

1,4-Dihydro-

- **1,4-Dihydro-1,4-ethenonaphthalenes**
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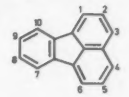
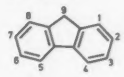


- Ring Synthesis 151
● **Fluorene**



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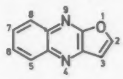
- **Furazan *N*-Oxides (Furoxans)**
- Ring Synthesis 150
● **Furo[2,3-*b*]quinoxaline**



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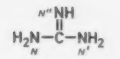

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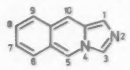
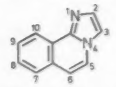
- Ring Synthesis 210

● Imidazo[1,5-*b*]isoquinoline



- 5,10-Dihydroimidazo[1,5-*b*]isoquinolines
- Ring Synthesis 19

● Imidazo[2,1-*a*]isoquinoline



- Ring Synthesis 232

● Imidazole

- Anellation Reactions 370
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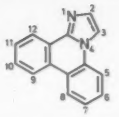


- Ring Synthesis 222

● Imidazo[1,2-*a*]pyridine

- Imidazo[1,2-*a*]pyridines
- Ring Synthesis 214
- 1,5-Dihydroimidazo[1,2-*a*]pyridines
- Ring Synthesis 370

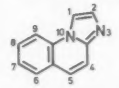
● Imidazo[1,5-*a*]pyridine

- Ring Synthesis 217, 218

● Imidazo[1,2-*a*]pyrimidine

- Ring Synthesis 214

● Imidazo[1,2-*a*]quinoline



- 1,2-Dihydroimidazo[1,2-*a*]quinolines
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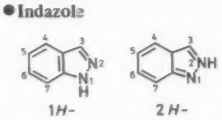
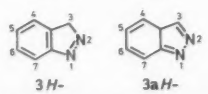


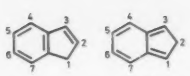
1*H*- 2*H*-



3*H*- 3a*H*-

- 2,3-Dihydroindazoles
- Ring Synthesis 750

● Indene



2*H*-

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- Ring Transformation 706
- Indanes
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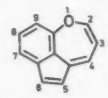
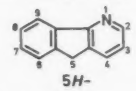
● Indeno[7,1-*bc*]oxepin



- Tetrahydroindeno[7,1-*bc*]oxepins
- Ring Synthesis 709

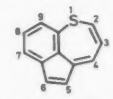
● Indeno[1,2-*b*]pyridine



5*H*-

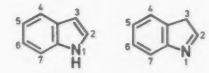
- Ring Synthesis 18

● Indeno[7,1-*bc*]thiepin



- 2,3,4,6-Tetrahydroindeno[7,1-*bc*]thiepins
- Ring Synthesis 708

● Indole



1*H*- 3*H*-

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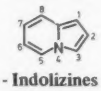

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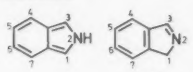

1*H*-

- 1,3-Dihydroisoindoles
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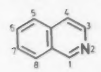
● Isoquinoline



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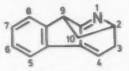
● 2,9-Methanoindeno[2,1-*b*]pyridine



2,9-Dihydro-3*H*-

- 1,2,4,4a,9,9a-Hexahydro-3*H*-2,9-methanoindeno[2,1-*b*]pyridines
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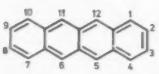
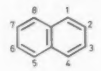


- 5,12-Dihydronaphthacenes
- Ring Synthesis 583
● Naphthalene



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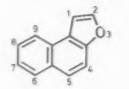
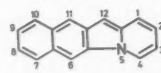
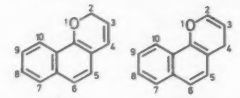


- 1,2-Dihydronaphtho[2,1-*b*]furans
- Ring Synthesis 800
● Naphtho[2,3-*b*]indolizine

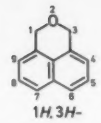


- 6,11-Dihydronaphtho[2,3-*b*]indolizines
- Ring Synthesis 222
● Naphtho[1,2-*b*]pyran



2*H*- 4*H*-

- 3,4-Dihydro-2*H*-naphtho[1,2-*b*]pyrans
- Ring Synthesis 166
● Naphtho[1,8-*cd*]pyran



1*H*,3*H*-

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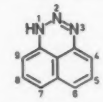
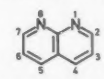


- Ring Transformation 151
● 1,8-Naphthyridine



- 1,8-Naphthyridines
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- 1,2,3,4,4a,5,6,7-Octahydro-1,8-naphthyridines
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- Ring Synthesis 585
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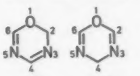
- Ring Synthesis 372
● **1,3,5-Oxadiazine**



2*H*- 4*H*-

- Ring Synthesis 38
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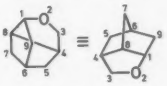
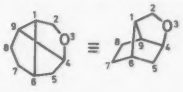
- Ring Synthesis 372
● **2-Oxatricyclo[4.2.1.0^{4,8}]nonanes**



- Ring Synthesis 620
● **3-Oxatricyclo[4.3.0.0^{4,9}]nonanes**



- Ring Synthesis 743
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- **4,5-Dihydro-P^V-1,3,5-oxazaphospholes**
- Ring Transformation 304
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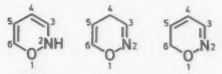
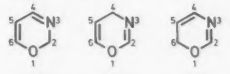


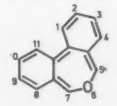
2*H*- 4*H*- 6*H*-

- **3,6-Dihydro-2*H*-1,2-oxazines**
- Ring Transformation 294
● **1,3-Oxazine**



2*H*- 4*H*- 6*H*-

- **5,6-Dihydro-4*H*-1,3-oxazines**
- Ring Transformation 303
● **1,4-Oxazine**



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- Ring Transformation 843 (4832)
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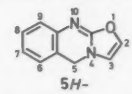

5*H*-

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Penam

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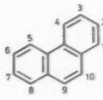

- **Phenanthrenes**
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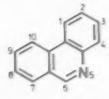
● **Phenanthridine**



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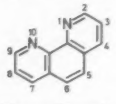

- Use as Ligands 22

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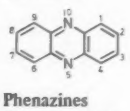

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● **Phosphorohydrazidic Acid Esters**
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● **Phosphorous Acid Esters**
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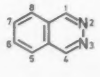
● **Phthalazine**



- Ring Synthesis 264

● **Polyenecarboxylic Acid Esters**
- Synthesis 57 (4627)

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- **Polyalcohols**
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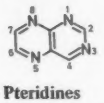
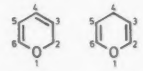
- Synthesis 39

● **Pteridine**



- **Pteridines**
- Ring Synthesis 96
- **7,8-Dihydropteridines**
- Ring Synthesis 96

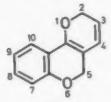
● **Pyran**



2*H*– 4*H*–

- **5,6-Dihydro-2*H*-pyrans**
- Reactions with Retention of the Ring Skeleton 72
- **Tetrahydropyrans**
- Ring Synthesis 64 (4648)

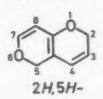
● **Pyrano[3,2-*c*][1]benzopyran**



2*H*,5*H*-

- **2*H*,5*H*-Pyrano[3,2-*c*][1]benzopyrans**
- Ring Synthesis 312, 680
- **4*H*,5*H*-Pyrano[3,2-*c*][1]benzopyrans**
- Ring Synthesis 680

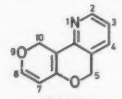
● **Pyrano[4,3-*b*]pyran**



2*H*,5*H*-

- Ring Synthesis 312

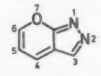
● **Pyrano[3′,4′:5,6]pyrano[4,3-*b*]pyridine**



5*H*,10*H*-

- **1,2-Dihydro-5*H*,10*H*-pyrano[3′,4′:5,6]-pyrano[4,3-*b*]pyridines**
- Ring Synthesis 312

● **Pyrano[2,3-*c*]pyrazole**



- **1,6-Dihydropyrano[2,3-*c*]pyrazoles**
- Ring Synthesis 324

● **Pyrazine**

- Pyrazines
- Ring Synthesis 53, 831
- Anellation Reactions 235
- 1,2,3,4-Tetrahydropyrazines
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● Pyrazole

3*H*- 4*H*-

- Pyrazoles
- from Like Ring Skeletons 684
- Ring Synthesis 52, 154, 357
- 4*H*-Pyrazoles
- Ring Transformation 372
- 2,3-Dihydropyrazoles
- Ring Synthesis 352
- 4,5-Dihydropyrazoles
- Ring Synthesis 684
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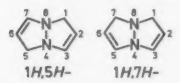
- Dihydropyrazolium Ylids
- Synthesis 803
- Reactions 804
- Pyrazolidines
- Ring Synthesis 147

● Pyrazolo[1,2-*a*]pyrazole



1*H*,5*H*- 1*H*,7*H*-

- 2,3-Dihydro-1*H*,5*H*-pyrazolo[1,2-*a*]-pyrazoles
- Ring Cleavage 803
- Tetrahydropyrazolo[1,2-*a*]pyrazoles
- Ring Synthesis 351, 804
- Ring Cleavage and Ring Transformation 352

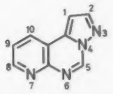
● Pyrazolo[1,5-*b*]pyridazine

- Ring Synthesis 229

● Pyrazolo[1,5-*a*]pyridine

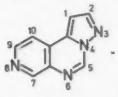
- Ring Synthesis 218, 231

● Pyrazolo[1,5-*c*]pyrido[3,2-*e*]pyrimidine



- Ring Synthesis 224

● Pyrazolo[1,5-*c*]pyrido[4,3-*e*]pyrimidine

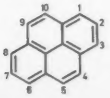


- Ring Synthesis 224

● Pyrazolo[1,5-*a*]pyrimidine

- Ring Synthesis 224

● Pyrene



- Ring Cleavage 660

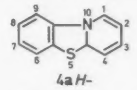
● Pyridazine

- Pyridazines
- Anellation Reactions 235, 368
- Ring Transformation 295, 378
- Pyridazine Di–*N*–oxides
- Ring Synthesis 837

● Pyridine

- Pyridines
- Ring Synthesis 1, 27, 377, 424 (4734), 586, 587
- Anellation Reactions 210, 366, 369, 691
- Ring Transformation 295
- Pyridine *N*-Oxides
- Reactions without Cyclization 217
- Pyridinium Salts
- Reactions 2
- Pyridinium Ylids
- Reactions 225
- 1,2-Dihydropyridines
- Ring Synthesis 367, 372, 546, 586
- 1,4-Dihydropyridines
- Ring Synthesis 8
- Reactions with Retention of the Ring Skeleton 550
- 1,2,3,4-Tetrahydropyridines
- from Like Ring Skeletons 545
- Ring Synthesis 112, 361, 373
- Ring Cleavage 112
- 2,3,4,5-Tetrahydropyridines
- Anellation Reactions 363
- Piperidines
- Anellation Reactions 201, 367, 615, 735

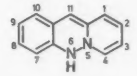
● Pyrido[2,1-*b*][1,3]benzothiazole



4a*H*-

- Ring Synthesis 371

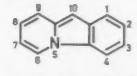
● Pyrido[1,2-*b*]cinnoline



6*H*-

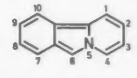
- Pyrido[1,2-*b*]cinnolinium Betaines
- Ring Transformation 370

● Pyrido[1,2-*a*]indole



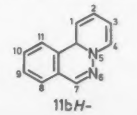
- 1,2,3,4-Tetrahydropyrido[1,2-*a*]indoles
- Ring Synthesis 215, 222

● Pyrido[2,1-*a*]isoindole



- Ring Synthesis 232

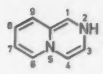
● Pyrido[2,1-*a*]phthalazine



11b*H*-

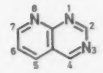
- Ring Synthesis 368

● Pyrido[1,2-*a*]pyrazine



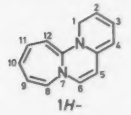
- Pyrido[1,2-*a*]pyrazinium Salts
- Ring Synthesis 19

● Pyrido[2,3-*d*]pyrimidine



- 1,2,3,4-Tetrahydropyrido[2,3-*d*]pyrimidines
- Ring Synthesis 18

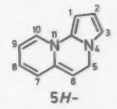
● Pyrido[1′,2′:3,4]pyrimido[1,2-*a*]azepine



1*H*-

- Dodecahydro-1*H*-pyrido[1′,2′:3,4]pyrimido-[1,2-*a*]azepines
- Ring Synthesis 201

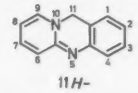
● Pyrido[1,2-*c*]pyrrolo[1′,2′-*a*]pyrimidine



5*H*-

- Decahydro-5*H*-pyrido[1,2-*c*]pyrrolo[1′,2′-*a*]-pyrimidines
- Ring Synthesis 201

● Pyrido[2,1-*b*]quinazoline



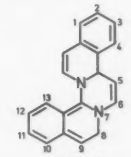
11*H*-

- 1,2,3,4-Tetrahydro-11*H*-pyrido[2,1-*b*]quinazolines
- Ring Synthesis 146

● Pyrimidine

- Pyrimidines
- Ring Synthesis 378, 799
- Anellation Reactions 214, 834
- Ring Cleavage 274
- Ring Transformation 295
- Pyrimidinium Betaines
- Anellation Reactions 370
- 1,4-Dihydropyrimidines
- Ring Synthesis 475
- 3,4-Dihydropyrimidines
- Ring Synthesis 475

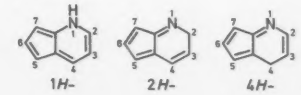
● Pyrimido[2,1-*a*;4,3-*a*′]diisoquinoline



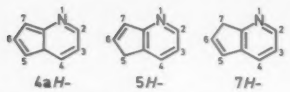
4b*H*,8*H*-

- 9,13b,15,16-Tetrahydro-4b*H*,8*H*-pyrimido-[2,1-*a*;4,3-*a*′]diisoquinolines
- Ring Synthesis 367

● 1-Pyrindine

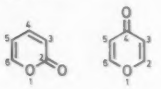


1*H*- 2*H*- 4*H*-



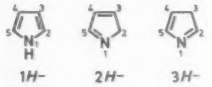
4a*H*- 5*H*- 7*H*-

- 6,7-Dihydro-5*H*-1-pyrindines
- Ring Synthesis 18
● Pyrones



2- 4-

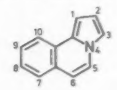
- 2-Pyrones
- Ring Synthesis 546
- Anellation Reactions 312
● Pyrrole



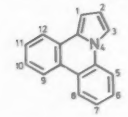
1*H*- 2*H*- 3*H*-

- Pyrroles
- from Like Ring Skeletons 281
- Ring Synthesis 51, 154, 294, 295, 586
- Anellation Reactions 224
- 2*H*-Pyrroles
- Ring Synthesis 304
- 3*H*-Pyrroles
- Ring Synthesis 304
- 2,3-Dihydropyrroles
- from Like Ring Skeletons 545
- Ring Synthesis 363, 478, 546
- 3,4-Dihydro-2*H*-pyrroles
- Ring Synthesis 831
- 2,5-Dihydropyrroles
- from Like Ring Skeletons 335
- Pyrrolidines
- from Like Ring Skeletons 540
- Ring Synthesis 831
● Pyrrolo[2,1,5-*cd*]indolizine

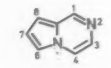
- Ring Synthesis 210, 370
● Pyrrolo[2,1-*a*]isoquinoline



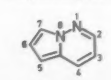
- Pyrrolo[2,1-*a*]isoquinolines
- from Like Ring Skeletons 225
- Ring Synthesis 223, 231
- 1,2,3,5,6,10b-Hexahydropyrrolo[2,1-*a*]isoquinolines
- Ring Synthesis 225
● Pyrrolo[1,2-*f*]phenanthridine



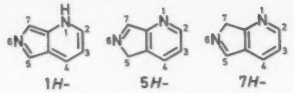
- Ring Synthesis 221
● Pyrrolo[1,2-*a*]pyrazine



- Ring Synthesis 228, 235
● Pyrrolo[1,2-*a*]pyridazine

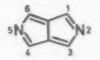


- Ring Synthesis 228, 235
● Pyrrolo[3,4-*b*]pyridine

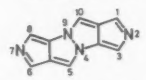


1*H*- 5*H*- 7*H*-

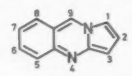
- 6,7-Dihydro-5*H*-pyrrolo[3,4-*b*]pyridines
- Ring Synthesis 19
● Pyrrolo[3,4-*c*]pyrrole



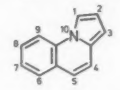
- Octahydropyrrolo[3,4-*c*]pyrroles
- Ring Synthesis 364
● Pyrrolo[3,4-*c*]pyrrolo[3′,4′:4,5]pyrazolo-[1,2-*a*]pyrazole



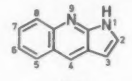
- Dodecahydro Derivatives
- Ring Synthesis 353
● Pyrrolo[2,1-*b*]quinazoline



- 1,2,3,9-Tetrahydropyrrolo[2,1-*b*]quinazolines
- Ring Synthesis 146
● Pyrrolo[1,2-*a*]quinoline

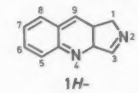


- Ring Synthesis 215, 227
● Pyrrolo[2,3-*b*]quinoline



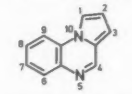
1*H*-

- Ring Synthesis 393
● Pyrrolo[3,4-*b*]quinoline

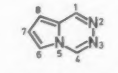


1*H*-

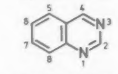
- 2,3-Dihydro-1*H*-pyrrolo[3,4-*b*]quinolines
- Ring Synthesis 373
● Pyrrolo[1,2-*a*]quinoxaline



- Pyrrolo[1,2-*a*]quinoxalines
- Ring Synthesis 230
- 1,2-Dihydropyrrolo[1,2-*a*]quinoxalines
- Ring Synthesis 371
● Pyrrolo[1,2-*d*][1,2,4]triazine



- Ring Synthesis 224
● Quinazoline



- Quinazolines
- Reactions with Retention of the Ring Skeleton 156, 535
- 3,4-Dihydroquinazolines
- from Like Ring Skeletons 535
● Quinol Derivatives
- Quinol Acylates
- Synthesis and Reactions 554
- Quinol Ethers
- Synthesis 102, 559 (4761)
● Quinoline

- Quinolines
- from Like Ring Skeletons 764
- Ring Synthesis 163, 249, 363, 799, 806, 826
- Anellation Reactions 215, 253, 371
- 1,2-Dihydroquinolines
- Ring Synthesis 393
- Anel'ation Reactions 595
- 3,4-Dihydroquinolines
- Ring Synthesis 370
- Ring Transformation 754
- 5,6,7,8-Tetrahydroquinolines
- Ring Synthesis 18
- 1,2,3,4,5,6,7,8-Octahydroquinolines
- Ring Synthesis 112, 362
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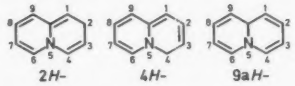
● Quinolizine



2*H*- 4*H*- 9a*H*-

- 4*H*-Quinolizines
- Ring Synthesis 219, 369
- 9a*H*-Quinolizines
- Ring Synthesis 219
- 3,4,6,7,8,9-Hexahydro-2*H*-quinolizines
- Ring Synthesis 363
● Quinols
- Synthesis 60 (4634), 554
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- Diphenoquinones
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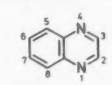
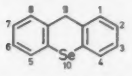
- Naphthoquinones
- from Like Ring Skeletons 659
- Reactions 222
- Polycyclic Quinones
- from Like Ring Skeletons 660
- Ring Synthesis 583
● Quinoxaline



- Quinoxalines
- Anellation Reactions 371
- 1,2-Dihydroquinoxalines
- Ring Synthesis 477
- 1,2,3,4-Tetrahydroquinoxalines

- from Like Ring Skeletons 477
- Ring Synthesis 658
● **Reductones**
- 1,4-Dioxoenediols
- Synthesis 133
● **Selenaxanthene**



- Selenaxanthones
- from Like Ring Skeletons 142
● **1,2-Selenazole**

- 1,2-Selenazolium Salts
- Ring Synthesis 273
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- Reactions 205 (4673)
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- Alkyl Aryl Selenides
- Synthesis and Reactions 278 (4694)
- Dialkyl Selenides
- Synthesis 280 (4700)
- Diaryl Selenides
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- Synthesis and Reactions 521
● **Selenonium Salts**
- Synthesis 280 (4700)
● **Selenophene**

- Ring Synthesis 521
● **Selenoxides**
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● **Semiacetals and Derivatives**
- *O,O*-Semiacetals

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- Synthesis 64 (4648)
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- Aminosilanes
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- 2-Alkenyl Silyl Ethers
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● **Spiro Compounds**
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● **Stannyl Ethers**
- Reactions 609
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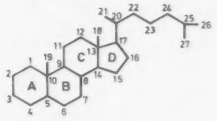

- General
- Reactions 25, 85, 208 (4681), 429, 439, 488 (4746), 813, 839 (4822), 840 (4823)
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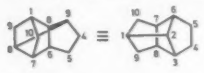

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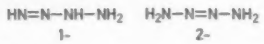

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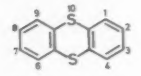

- Ring Synthesis 666
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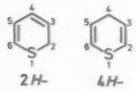

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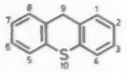

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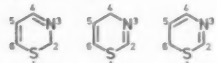
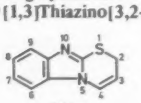


- **5,6-Dihydro-4*H*-1,3-thiazines**
- Ring Synthesis 336
- **● [1,3]Thiazino[3,2-*a*]benzimidazole**



- Ring Synthesis 189
- **● 1,3-Thiazole**

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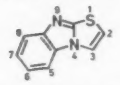
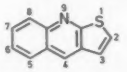


- Ring Synthesis 189
- **● Thieno[2,3-*b*]quinoline**



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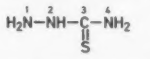

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- **● Triacetonamine**

see: Pyridine (Piperidines)

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- Ring Synthesis 147
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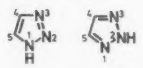

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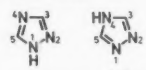
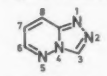


- **4,5-Dihydro-3*H*-1,2,4-triazoles**
- Ring Synthesis 155
- **● 1,2,4-Triazolo[4,3-*b*]pyridazine**



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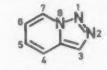
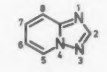


- Ring Synthesis 218
- **● 1,2,4-Triazolo[1,5-*a*]pyridine**



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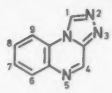
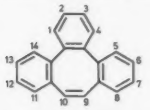
- Ring Synthesis 218
● [1,2,4]Triazolo[1,5-*c*]pyrimidine

- Ring Synthesis 834
● [1,2,4]Triazolo[4,3-*a*]quinoxaline



- Ring Synthesis 230
● Tribenzo[*a*,*c*,*e*]cyclooctene



- 9,10-Dihydrotribenzo[*a*,*c*,*e*]cyclooctenes
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● Tricyclo[5.2.1.$0^{2,6}$]decane

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- Ring Synthesis 582
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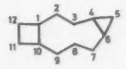

- Ring Synthesis 461
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- Ring Transformation 467
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- 3,5,10-Trioxatricyclo[5.2.1.$0^{2,6}$]decanes
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- Ring Synthesis 257
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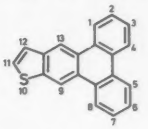

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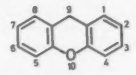

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Authors' Guidelines

I. Review Articles

Potential authors are asked to contact Prof. G. Schill or Prof. G. Sosnovsky before submitting a manuscript in order to avoid disappointment or exceptionally long delays in publication.

The subject matter which might be acceptable is almost unlimited provided that the emphasis is on practical methods in synthetic organic chemistry. The article should give either a complete description of the methods which have not been previously reviewed or a critical evaluation of new developments to known methods. The manuscript should be written in the style currently used in SYNTHESIS and should include as many up-to-date, key references as possible. Language of publication is English or German.

In addition to the suggestions given in Section III, the following points should be followed during the preparation of manuscripts for review articles:

1. The manuscript should not exceed 40 pages (DIN A4 or Quarto), including references, formulae, and tables, typed with double spacing (~15–20 printed pages). Longer articles may be accepted under exceptional circumstances; however, publication of such articles may be delayed until sufficient space is available.
2. The methods described must be illustrated by detailed descriptions of the experimental procedures involved. These should preferably be unpublished or be selected from less common sources. A critical evaluation of the methods should be given whenever possible.
3. Discussion of theory and mechanism should be limited to the minimum necessary for a clear understanding of the reactions under consideration. Historical background should be avoided or restricted to a minimum.
4. Clear reaction schemes (not only individual structures) should be given and tabulation of critically selected analogous results made whenever possible.
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III. Preparation of Manuscripts

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1. Three copies of the manuscript should be submitted. The manuscript should be typed double spaced; indentations and underlinings should be avoided (except for complicated cases, as in sugar chemistry, where the type of script to be used may be indicated by underlining). In the case of manuscripts with more than one author, the author to whom correspondence is to be addressed should be indicated (*).

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3. Whenever possible, clear formulae (reaction schemes are to be preferred to individual structures) should be given for the reaction described. Freehand drawings of organic structures are acceptable. However, it is emphasised that the presentation should be clearly and neatly carried out.

   Note: for iodine, the sign J is used, not I (for reasons of clarity, as the capital I is identical with the Roman numeral I and in some types of script also with the small letter l and the numeral 1).

4. In the presentation of tables, the form of the tables already published in SYNTHESIS should be followed.

5. Experimental procedures should be concise but contain all essential data referring to performance of the reaction and isolation of products. For all compounds prepared, yields of isolated product should be given (amount and percentage based on starting material). Manuscripts in which yields are not given or in which yields are estimated only by G.L.C. or by spectral methods may not be accepted. When the preparation of a series of similar (e.g. homologous) compounds is described, a general procedure should be given and the data for the individual compounds presented in tabular form.

Example:

4-Oxo-4,5-dihydrofuro[2,3-c]quinoline:
A solution of furan-2-carboxanilide (200 mg, 1.07 mmol) in a mixture of benzene (180 ml) and ethanol (20 ml) is irradiated with a 100 Watt high-pressure mercury lamp at room temperature for 10 h. The solvent is removed in vacuo and the residue separated by preparative T.L.C. on silica gel using benzene/ethyl acetate (4:1) as eluent; yield: 50 mg (25 %); m.p. 282.5 – 283° (from ethanol).

$C_{11}H_7NO_2$ (185.2) calc. C 71.35 H 3.81 N 7.56
found 71.16 3.88 7.49

M.S.: m/e (relative intensity) = 185 ($M^{\oplus}$, 65), 156 (34), 129 (100), 102 (78).

I.R. (Nujol): ν_{max} = 3150, 1680 cm^{-1}.

U.V. (ethanol): λ_{max} = 218 (ε = 67 000), 258 (8 900), 308 (9 100), 320 nm (7 300).

^{1}H-N.M.R. (DMSO-d_6): δ = 8.10 (s, 1H), 7.94 (d, 1H, J = 7 Hz), 7.50 (s, 2H), 7.33 ppm (s, 2H).

Further example for the presentation of N.M.R. data:

^{1}H-N.M.R. ($CDCl_3$): δ = 8.2 (s, 1H, -N=C<u>H</u>-), 6.9 (s, $1H_{arom}$), 6.61 (s, $1H_{arom}$), 3.89 (m, 4H, $-CH_2-CH_3$), 3.49 (d, 6H, $-OCH_3$, J = 3 Hz), 0.81 ppm (m, 6H, $CH-CH_3$).

For new compounds (which should be clearly indicated as such), sum formulae, molecular weights to 1 decimal place, and elemental analyses (where possible) and characteristic physical and spectral data should be given. In order to save space elemental analysis data in tables may be removed *by the editorial staff* and replaced by a footnote "All compounds gave satisfactory elemental analysis (C ± 0.3%, H ± 0.14%, etc)". I.R. absorptions must be given in wave-numbers ν [cm^{-1}], not in wavelengths, λ; U.V. data in wave lengths λ [nm]; and N.M.R. data in δ values, not τ values. For all spectral data, the solvent used must be given. For known compounds physical data with comparative literature values should be given. Corrected values should be given for all melting and boiling points.

6. In the text, full chemical names should be used instead of formulae whenever possible (e.g. hydrogen chloride or hydrochloric acid, respectively, not HCl). In certain cases, however (e.g. complexes having complicated names) formulae will be accepted.

7. The following abbreviations should be used:

Groups (to be used in formulae):

A	Groups such as $-(CH_2)_n-$, $-C_6H_4-$, and hetero analogs
M	Metal
R	(preferentially) C-Substituents
X	Halogen, OR, NR_2, SR, etc. (monovalent)
Y	O, S, NH, etc. (bivalent)

and the abbreviations used in peptide and sugar chemistry.

Methods

C.D.	Circular dichroism
E.S.R.	Electron-spin resonance spectrum
G.L.C.	Gas-liquid (partition) chromatography
H.P.L.C.	High pressure liquid chromatography
I.R.	Infra-red spectrum
M.S.	Mass spectrum
N.M.R.	Nuclear magnetic resonance spectrum
N.Q.R.	Nuclear quadrupole resonance spectrum
O.R.D.	Optical rotatory dispersion
T.L.C.	Thin-layer chromatography
U.V.	Ultra-violet spectrum

Measures

nm	nanometer
mm	millimeter
cm	centimeter
m	meter
mg	milligram
g	gram
kg	kilogram

ml	milliliter
l	liter
mmol	millimole(s)
mol	mole(s)
equiv	equivalent
sec	second
min	minute
h	hour
torr	torr (mm Hg)
atm	atmosphere (do not use "psi")
°	degree (temperature); note: ° implies °C (C is deleted)

Miscellaneous (to be used in formulae, experimental procedures, footnotes, tables etc.)

b.p.	boiling point
m.p.	melting point
subl.p.	sublimation point
r.t.	room temperature (only in formulae and tables)
Mol. weight	Molecular weight
∇	heating (only in formulae)
ϕ	diameter

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Examples:

[1] G.H.Williams, Homolytic Aromatic Substitution, Pergamon Press, London, 1970, p. 92.

[2] H.Viehe, Z.Janousek, Angew. Chem. 83, 614 (1971); Angew. Chem. Int. Ed. Engl. 10, 573 (1971).

[3] M.Černý, J.Málek, Tetrahedron Lett. 1969, 1739.

[4] M.D.Scott, J. Chem. Soc., Perkin Trans. 1 1972, 1432.

[5] A.M.Knowles et al., J. Chem. Soc. [C] 1971, 598.

[6] N.L.Burde, L.V.Alekseeva, B.N.Lundin, Zh. Obshch. Khim. 38, 439 (1968); J. Gen. Chem. USSR 38, 434 (1968).

[7] F.Eloy, R.Lenaers, C.Moussebois, U.S.-Patent 3 227 725 (1966), Union Carbide Corp.; C.A. 64, 9736 (1966).

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